



## IPQ™ Wireless Broadband Monitoring Solution

*Subscriber Service Analysis*

An innovative and scalable  
solution for 2G/3G & 4G wireless  
service measurement

---

---

## Measured at the point of Delivery

Mobile Broadband networks - Quality of Service (QoS) is the primary differentiator.

### IPQ™

Excellent QoS makes the difference between a satisfied customers and high churn rates. To take control of network quality MNOs must have a scalable solution to measure radio and IP quality, receive continuous information and optimize regularly.

Epitiro's **IPQ™** is a scalable smartphone-based wireless broadband measurement technology that allows network operators to collect and understand both RAN coverage and IP performance directly from the Consumer devices . As a truly autonomous system, IPQ provides 24x365 service analysis in real-time without the cost of 24x7 personnel.

IPQ delivers end-to-end coverage and IP QoS information to all levels within the organization and gives you an overview of network quality as perceived by your customers, while also providing the KPIs and RF information necessary for reporting, troubleshooting and network coverage analysis.

### Features

- ✓ Enable MNOs to continually measure wireless broadband quality
- ✓ Capture real-time performance data on QoS /QoE from your subscribers
- ✓ Perform fault testing to proactively isolate problems and reduce MTTR
- ✓ Prove end-to-end service performance and validate SLAs
- ✓ Verify RAN and Core network quality
- ✓ Full-range of IP-specific performance data including TCP/UDP & MPLS support
- ✓ Detect coverage and capacity issues in the wireless broadband network
- ✓ Real-time insight into the consumer perception of your network
- ✓ Generate reports and information for each tier of your organization
- ✓ Collect data from competitor networks for benchmarking purposes
- ✓ Reduce cost, Reduce churn, Increase profits

---

## Over-the-Air Installation

The IPQ software can be installed in seconds. Using either an online “app store” or through an operator-branded portal, the software is quickly and easily deployed on Customer or Employee Smartphones and Tablets.



Once on the Smartphone the software contacts the “Mission Control” server online to download a profiled set of instructions defined by the Operator. These instructions can include a vast range host of IP measurements and each can be driven by a variety of events. Once activated on the Subscriber’s Smartphone, IPQ performs its measurements automatically and unobtrusively, with no further actions required by the Customer or Operator.

IPQ testing capability can be deployed to smartphones with a configurable range of testing instructions and in a range of operating modes including:

- Autonomous Testing (High volume deployment) to Subscribers
- Drive Testing
- Service Benchmarking

## Autonomous Operation

In Autonomous mode, where the software is running on subscriber or employee devices, testing takes place in the background, when the service is not being otherwise used and has no impact on the user’s day-to-day activities. Each measurement required is mapped directly using the Smartphone’s integrated GPS function. In cases where GPS fix is not available the cell ID and neighbouring cell information is used to estimate location. Critical radio information is also captured along with broadband-specific service metrics.



---

Intelligent  
Testing and  
network  
utilisation

IPQ's intelligent test scheduling capability ensures that precious RAN and backhaul resources are not over-utilised by avoiding testing on pre-defined Cell sites and only testing individual Cells when required. Before each test the device validates testing requirements and durations for the current serving Cell and only tests if required. Under resourced cells can also be removed entirely from the autonomous testing environment.

Drive Testing

In **drive test mode** the devices operate on a pre-defined schedule, defined by your requirements, and collecting a greater range of metrics throughout the testing cycle. Testing slots can be defined with a 5-minute granularity – 24x7.

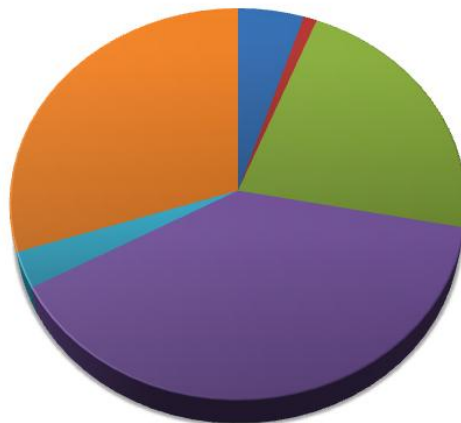


Competitor  
Analysis and  
Service  
Benchmarking

IPQ Software can be quickly and easily deployed on supported subscriber devices from competing network Operators nationally or internationally to provide a benchmark of service delivery across a range of Radio coverage and broadband-specific KPIs.

Coverage  
Analysis and  
WiFi Handoff

By distributing high-speed Internet access from Cable, DSL and other fixed broadband connections within homes and wireless hotspots, Wi-Fi has dramatically increased productivity and reduced macro network costs. Today, nearly pervasive, Wi-Fi deliver high-speed connectivity to millions of homes, offices and public locations. As converged services continue to invest in the integration and hand-off to wireless networks using Wi-Fi (IEEE 802.11) there is a growing need to better understand and predict service coverage of both indoor and outdoor networks. IPQ will provide coverage analysis and, if required, Wi-Fi performance right down to an individual node or pe- user level.



■ EDGE ■ GPRS ■ 3G ■ HSDPA ■ HSUPA ■ Wi-Fi

## Scalability

IPQ's underlying reporting technology has been scaled to support over 100,000 deployed devices testing and reporting in real-time.

## Performance Indicators from where it matters – your customer

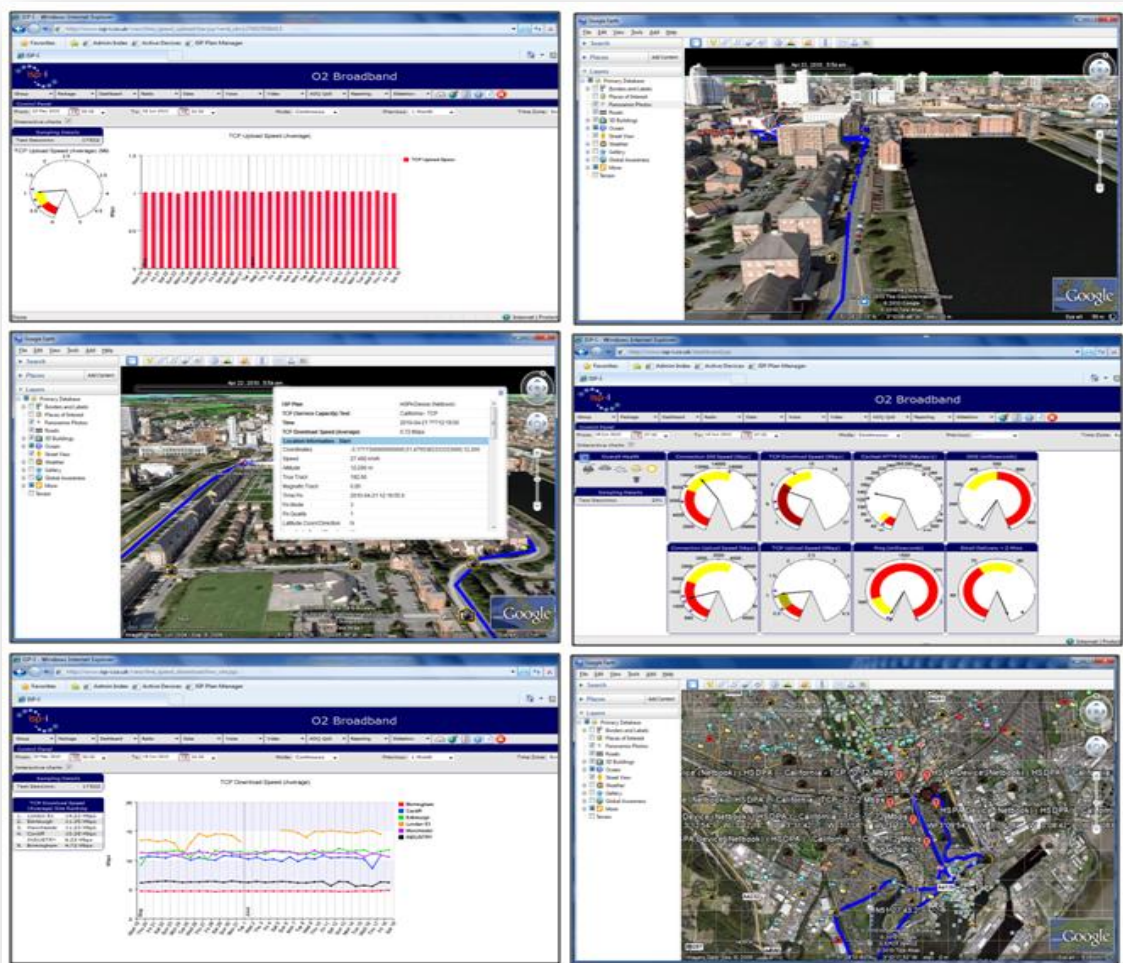
IPQ opens up new ways of effortlessly and autonomously collecting wireless coverage and end-to-end broadband-specific performance data from anywhere in the network. By removing CAPEX requirements and deploying software on your Subscribers' Smartphones you will have more scalable, accurate and cost-effective information to optimise every aspect of network delivery

## Dashboard and on-demand Reporting

Detailed reporting is Available on-demand. The IPQ dashboard shows the data in any required context including information location and network layer metrics.

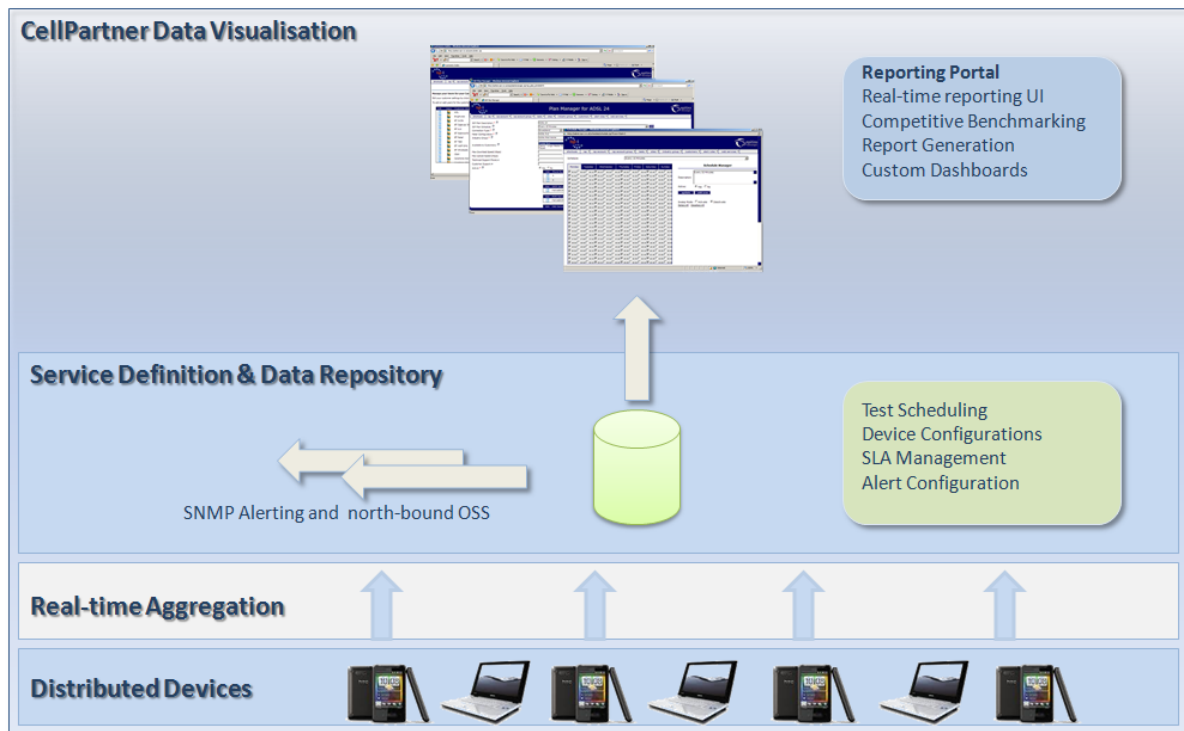
## Instant Export & Visualisation

IPQ's reporting output includes the option to map any KPI or set of KPIs, view or set of KPIs to Google Earth instantly.



## Architecture

Each registered device (Smartphone or PC) can be remotely updated with test scripts and schedules on-demand. All performance reporting is transmitted, in real-time, to the central alerting and reporting servers. This allows a real-time 24x7x365 system of data collection and reporting.



## Flexible & Powerful

### An national or international IPQ deployment will give you:

- True Insight into the actual Subscriber's perception of the network, thanks to measurements taken in handset rather than in network.
- 24x365 information without the cost of 24x365 staff. Every customer-affecting point in the network is tested and reported in real-time around the clock by your Subscribers.
- Totally automated broadband-specific performance data provides accurate knowledge of the network and is immediately available to the entire organization; all the way from the CEO to engineers in the field.
- Analysis and benchmarking with the aid of tables, maps, chart, and spreadsheet presentations of high-level statistics as well as individual Cells. Competing Operators, networks, or geographies can be benchmarked with respect to wireless broadband performance parameters.
- Data can serve as input to third-party statistical reporting tools from industry leaders such as Oracle®, Microsoft® and SPSS®.

## Specification & Data Collection

IPQ is supported on a vast range of mobile devices from leading manufacturers including:- **Acer, Dell, Garmin, Kyocera, HTC, Huawei, Lenovo, LG, Motorola, Samsung, Sony Ericsson, T-Mobile, Vodafone, ZTE**



**Additionally all release of Microsoft Windows from Windows XP onwards are fully-supported**

Broadband Performance Metrics captured per test session	
DL throughput speed (single and multi-threaded TCP)	Max achievable over-the-air download throughput speed (single and multi-threaded TCP sessions to ensure maximum capacity reached)
UL throughput Speed (single and multi-threaded TCP)	Max achievable over-the-air uplink speed (single and multi-threaded TCP sessions to ensure maximum capacity reached)
UDP / Real-time services	Includes RTP-based VoIP, Video and MPLS/QoS
Network Latency	Round-trip latency (ICMP-based RTD using PING)
Network Packet Loss	% of dropped packet during test session
Network Jitter	Network Jitter
Transparent HTTP Content Compression Ratio	Specific HTTP and non-PORT 80 testing to understand MNO's Image compression models and compression ratios
Web Browsing (HTTP) cached & Uncached	Browsing /Download time (KB/s) a range of consumer web sites Includes modification of HTTP "Cache-Control" and "Pragma" headers
Video Streaming ITU G.1070 & RFC4445 (MDI)	Real-time UDP-based Video with various CODECs:- MDI Video MOS, Network throughput Jitter, Latency and Loss –
DNS Performance	DNS Response times for a variety of URL requests
DNS Failure Rates	%age of DNS failures recorded for a variety of URLs
Network Availability (by Access Protocol)	%age of network availability for each Operators network by region and by access technology (NO_NETWORK, GPRS, EDGE, 3G, HSDPA, HSUPA ...)

GPS Information	
Latitude	The latitude of the fix.
Longitude	The longitude of the fix.
UTC timestamp	UTC time of this fix, in milliseconds since January 1, 1970.
Distance to Basestation *	Returns the distance in meters between this probe and serving the NodeB
PSC	Primary Scrambling Code – 9 bits format in UMTS only
Altitude	Altitude of this fix.
Speed	Speed of the device over ground in meters/second <i>(for in-motion testing)</i>
Bearing	T he direction direction <i>(for in-motion testing)</i>

---

## Radio Frequency (RF) Information - per individual test (Smartphone only)

Location Area Code (LAC)	Location Area Code for the fix
Cell ID	ID of serving NodeB for the fix
LAC	Location Area Code
Received Signal Strength	The current received signal strength (dBm) for the fix - as defined in TS 27.007 8.5
Access Protocol	GPRS, EDGE, UMTS, HSDPA, HSUPA, HSPA, ETC..
GSM BERT	GSM Bit Error Rate (TS 27.007 8.5)
Neighbouring Cell Info	Neighbouring Cell Info (CellID, LAC, dBm) is also available (if required)

**IPQ™**

In any business controlling Costs and the efficient use of resources and personnel is critical. IPQ provides the opportunity to measure quality from the Subscriber perspective more closely and economically than ever before.



**Epiteiro (UK)**

Epiteiro House, 10 Raleigh Walk  
Waterfront 2000, Brigantine Place  
Cardiff CF10 4LN

Tel: +44 (0) 870 850 6563

**Epiteiro (Ireland)**

Unit 17, Tom Crean Business Centre  
Kerry Technology Park, Tralee  
County Kerry, Ireland

Tel: +353 (0)66 712 9794

**Epiteiro (New Zealand)**

Level 27 PWC Tower  
188 Quay St, Auckland  
New Zealand

Tel: (+64) (0) 9 363 2995

**Epiteiro (Australia) Pty Ltd**

Level 22, 201 Miller Street  
North Sydney  
NSW 2060, Australia

Tel: (+64) (0) 9 363 2995

**Epiteiro (Singapore) Pte**

120 Telok Ayer Street  
#00-00  
Singapore, 068589

---

info@epitiro.com | www.epitiro.com